4 BLOOD ALCOHOL

4.1 Objectives

4.1.1 Understand the theory and application of headspace gas chromatography (GC).

4.1.2 Comprehend the function and the specifics of operation of headspace GC.

4.1.3 Prepare specimens for analysis by headspace GC.

4.1.4 Operate the headspace GC.

4.1.5 Calibrate the instrument and quantitate ethanol, methanol, acetone and 2-propanol.

4.1.6 Interpret results by thoroughly examining and explaining the chromatograms.

4.1.7 Understand the use of internal and external standards.

4.1.8 Demonstrate proficiency by analyzing two full runs (20 samples each) of blood alcohol cases.

4.1.9 Process results and record results of medical examiner, DUI/DUID and police casework.

4.2 Estimated Time: One month

4.3 Methods of Instruction

4.3.1 Lectures

4.3.1.1 Principles of headspace GC

4.3.1.2 Operation of the headspace GC

4.3.1.3 Specimen preparation (dilution, internal standard, external standard)

4.3.1.4 Calibration and QC

4.3.1.5 Result interpretation

4.3.1.6 Paperwork processing in medical examiner, DUI/DUID and police casework

4.3.2 Literature Review

4.3.2.1 Garriott, J. C., *Medicolegal Aspects of Alcohol*. 4th[d] Ed. 2003, Lawyers & Judges Pub. Co, Inc.

4.3.2.2 Toxicology Technical Procedures Manual

4.3.2.3 Code of Virginia (§18.2-266)

4.3.2.4 Moffat, A.C., editor. *Clarke's Analysis of Drugs and Poisons*, 3rd edition. London: The Pharmaceutical Press, 2004 pp 53-67.

4.3.3 Demonstration

4.3.3.1 Blood alcohol analysis and operation of the headspace GC will be observed from beginning to end and notes will be taken by the Trainee.

4.3.4 Laboratory Exercises

4.3.4.1 Analyze one batch of 20 ME blood specimens for ethanol. At least 5 of the specimens will be positive for ethanol and at least one specimen will be negative.

4.3.4.2 Analyze one batch of 20 DUI blood specimens for ethanol. At least 10 of the specimens will be positive for ethanol and at least one specimen will be negative.

4.4 Evaluation:

4.4.1 Written Examination

4.4.1.1 This will be administered as a "take home" exam.

4.4.2 Laboratory Competency Testing

4.4.2.1 A series of at least 20 previously analyzed ME blood specimens will be presented to the Trainee for a routine blood alcohol analysis. Trainee's results must fall within 10% of the previous results.

4.4.2.2 A series of at least 20 previously analyzed DUI/DUID blood specimens will be presented to the Trainee for a routine blood alcohol analysis. Trainee's results must fall within 10% of the previous results.

4.5 Examination Questions

4.5.1 Explain when calibration or recalibration of the headspace GC is necessary. How is recalibration accomplished?

4.5.2 What is NIST? Why is it important?

4.5.3 Discuss the relationship between the concentration of alcohol in blood with that in urine, serum, and vitreous humor.

4.5.4 Explain the difference between serum and blood ethanol.

4.5.5 Explain what causes the blood alcohol concentration in a specimen to either decrease or increase. What measures can be taken to prevent this?

4.5.6 Explain the ethanol interconversion between mg/L, mg/dL, µg/mL and gm%. Present 5 examples of each.

4.5.7 What is the purpose of running a mixed volatile control during the prerun? How can you calculate the acetone concentration, if present.

4.5.8 What are the properties of a good internal standard?

♦ **End**